International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 324-329 www.ijdmsrjournal.com ISSN: 2582-6018

An Original Research –To Compare the Validity of Peck and Peck Index among Bhopal Population

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Submitted: 20-07-2021 Revised: 29-07-2021 Accepted: 31-07-2021

ABSTRACT:

Aim: To compare the validity of Peck and Peck ratio in Bhopal population.

Method: 180 patients having class I malocclusion were selected from the patient data of Department of Orthodontics and Dentofacial at RKDF Dental College and Research Centre, Bhopal out of which 90 are males and 90 are females with age group between 14-28 years. The Statistical software IBM SPSS statistics22.0 (IBM Corporation, Armonk, NY, USA) was used for the analyses of the data.Z tests was performed between the variables.

Result: peck and peck index [1] norms for males 88.40 ± 4.30 and females was 90.40 ± 4.80. In our study the Ratio of central incisor for males was 93.01± 4.2 and for females was 90.8 ± 6.8. ratio of lateral incisor for males was 97.1± 5.7 and for females was 94.11 ± 6.1. In the present study, significant differences were observed for the tooth shape ratios between the two sexes having males higher index values than females whereas peck and peck found non significant differences between two sexes.Mesiodistal width of central incisor for males was 5.13± 0.36 and for females was 4.82± 0.33.mesiodistal width for lateral incisor for males was 5.52 ± 0.39 and for females was 5.3 ± 0.35.Faciolingual width of central incisor for males was 5.32 ± 0.37 and for females was 5.31 ± 0.40 .Faciolingual width of lateral incisor for males was 5.65 ± 0.40. This study showed significant differences for mesiodistal widths between the two sexes but it is also observed that the mean faciolingual width did not show any significant difference.

Conclusion: The study was carried out to check the validity of peck and peck analysis for Bhopal population.

1.Significant differences observed for the tooth shape ratios between the present study and the earlier Peck and Peck study.

2.In the present study, significant differences were observed for the tooth shape ratios between the two sexes .Tooth shape ratio for males was higher than females. Whereas peck and peck found non significant differences between two sexes.

3.This study showed significant differences for mesiodistal widths between the two sexes but it is also observed that the mean faciolingual width did not show any significant difference.

It is therefore concluded, that original Peck and Peck ratio cannot be used as an absolute guide for Bhopal population.

KEYWORDS: Peck and Peck ratio,malocclusion.

I. INTRODUCTION

A disproportion in the size of teeth in either arch makes it difficult to obtain good intercuspation and thereby an optimal occlusion and thus it reflects in both arches as crowding or spacing [2] .Crowding is a common characteristic of malocclusion .The four mandibular incisors are the teeth most prone to positional irregularity. Tooth size and crown proportion is only one of the several factors that may be involved in the etiology of dental crowding.[3]

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The etiology is multifactorial such as decrease in dental arch length, maturation and aging of the dentition,mesial drift, soft tissue pressure, pressure from the back of the dental arch, tooth morphology, the amount and direction of late mandibular growth,skeletal structures and complex growth patterns, direction of eruption and degenerative tissue changes.[4,5]

Malocclusion is the result of either a skeletal or a dental discrepancy, but crowding is a consequence of a tooth size arch-length discrepancy.[6] The prevalence of dental crowding was higher in the anterior region, where as it decreased in the premolar and molar region[7] .The most prevalent malocclusion results from excess tooth size compared with the size of the supporting bone, this creates a tooth-size arch-size discrepancy [8]. Individuals with Angle's Class I and Class III malocclusions have shown to have greater prevalence of tooth size discrepancies than do individuals with Class II malocclusion. Also, mesio-distal tooth width provides valuable information on human evolution [9] .

Several studies were published describing the importance of a correct tooth size proportion between the upper and lower arches. Several methods have been described to evaluate interarch tooth size relationship such as Kesling's diagnostic setup[10], Neff's anterior coefficient[11] and Bolton's ratios for the six anterior teeth, and the overall ratio for the 12 teeth[12] . In 1972, Peck & Peck[1] published their work on the tooth shape (mesiodistal and faciolingual dimensions) deviations as a determining factor in the presence or absence of lower incisors crowding. They selected 45 cases with perfect mandibular incisor alignment and compared the mesiodistal and faciolingual diameter of the mandibular central and lateral incisors with the 70 control subjects.They found that well-aligned mandibular central incisors have an MD/FL index of 88.4±4.3, while well-aligned mandibular lateral incisors have an index of 90.4± 4.8. . Range For mandibular central incisors is 88%-92% and for mandibular lateral incisors is 90%- 95%. Lower incisors within or below these ranges are considered favorably shaped. Any lower incisor with an MD/FI, index above these ranges, is considered to have a crown shape deviation which may influence or contribute to the crowding phenomenon .

There is no literature available to check the validity of peck and peck index in in Bhopal population. Hence a study, was carried out in the Department of Orthodontics, RKDF Dental College and Research Center ,Bhopal to check the validity of peck and peck ratio among Bhopal population.

II. AIM AND OBJECTIVES

1.Comparison of Peck and Peck index with present study.
2.Comparison of tooth shape ratios between males and females.
3.Comparison of mesiodistal and faciolingual widths among males and females.

III. METHOD AND MATERIAL

The study was conducted in the Department of Orthodontics and Dentofacial Orthopedics a RKDF Dental College and Research Centre, Bhopal . 180 sets of dental casts having class I molar relation were selected from the patient data of the Department of Orthodontics and Dentofacial Orthopedics at RKDF Dental College and Research Centre, Bhopal

Study Location: Department of Orthodontics and Dentofacial Orthopedics of RKDF Dental College and Research Centre, Bhopal

Study Duration: January 2018 to December 2019.

Sample size: 180 patients (90 males and 90 Females)

The subjects belonged to the age range of 14 to 28 years.

Inclusion criteria

1. Dental occlusion with Class I molar and canine relation with an overjet or overbite < 3 mm
2. Cases with minimal rotations, slipped contacts, crowding or spacing in each jaw up to 2 mm were selected
3.Good quality pretreatment models
4.Complete permanent dentition from 1st molar to 1st molar in both arches
5.Absence of mesiodistal and occlusal abrasions or caries or Class II fillings,dental prosthesis,partially erupted teeth.

Exclusion criteria

1.Gross restorations, buildups, crowns, onlays, Class II amalgams, or composite restorations that affect the tooth's mesiodistal diameter.
2.Congenital defects or deformed teeth.
3.Obvious interproximal or occlusal wear of teeth.
4.No missing teeth.
5.Subjects with previous history of orthodontic treatment.

A digital vernier caliper calibrated to the nearest 0.01 mm was used to measure the mesiodistal measurements of the teeth on the patients cast. The labiolingual width of the mandibular incisor teeth were measured by placing the caliper beak on the maximum contour area at the faciolingual

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plane of the mandibular central and lateral incisors. The ratio defined by Peck & Peck [1] for mandibular central incisors is 88%-92% and for lateral incisors is 90%-95%. The formula used for this calculation is:

INDEX % = Mesiodistal width of central incisor(mm)/Lateral incisor (mm) X100

Labiolingual width of central incisor (mm)/Lateral incisor (mm)

Lower incisors within or below these ranges are considered favorably shaped. Any lower incisor with a mesiodistal/faciolingual, index above these ranges is considered to have a crown shape deviation which may influence or contribute to the crowding phenomenon.

The data were collected, tabulated and statistically analyzed on Statistical Packages for the Social Sciences (SPSS) software (PASW, Windows version 18.0. Chicago).Z Tests are performed between the variables.

Table 1- Comparison of peck and peck index with present study.

	groups	Mean	SD	Z value
Central incisor	males	93.01	4.2	5.4005**
	Peck and peck study	88.40	4.30	
	females	90.8	6.8	2.0137*
Lateral incisor	males	97.1	5.7	5.959**
	Peck and peck study	90.40	4.80	
	females	94.11	6.1	3.608**

*Significant at p< 0.05 ; **highly significant where p <0.01

Graph 1- Comparison of peck and peck index with present study.

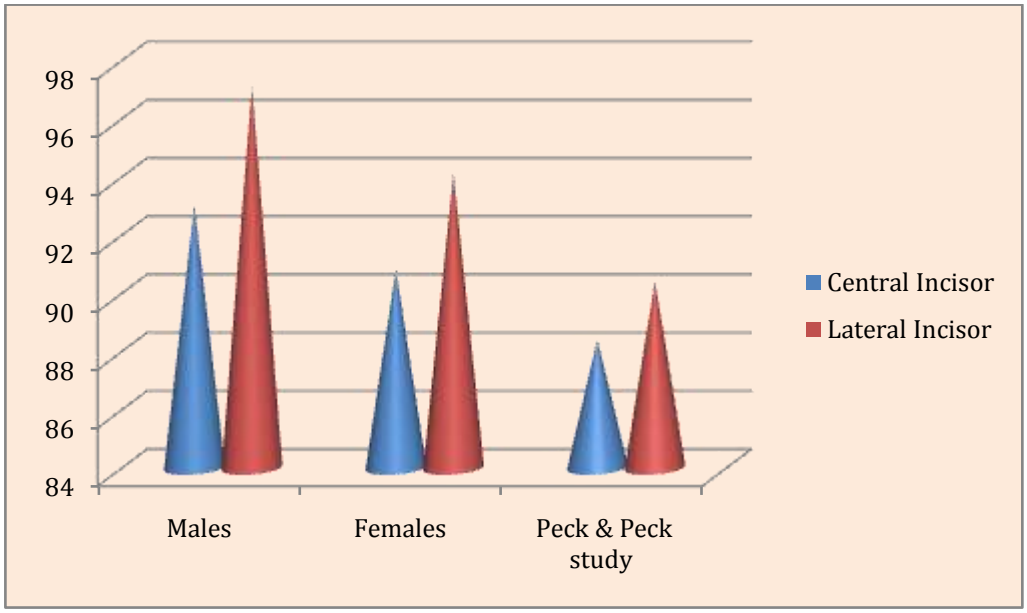

Table 2-Comparison of tooth shape ratios between males and females

	groups	Mean	SD	Z value
Central incisor	males	93.01	4.2	1.9923
	females	90.8	6.8	
Lateral incisor	males	97.1	5.7	2.1567
	females	94.11	6.1	

*Significant at p< 0.05 ;

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Graph 2-Comparison of tooth shape ratios between males and females

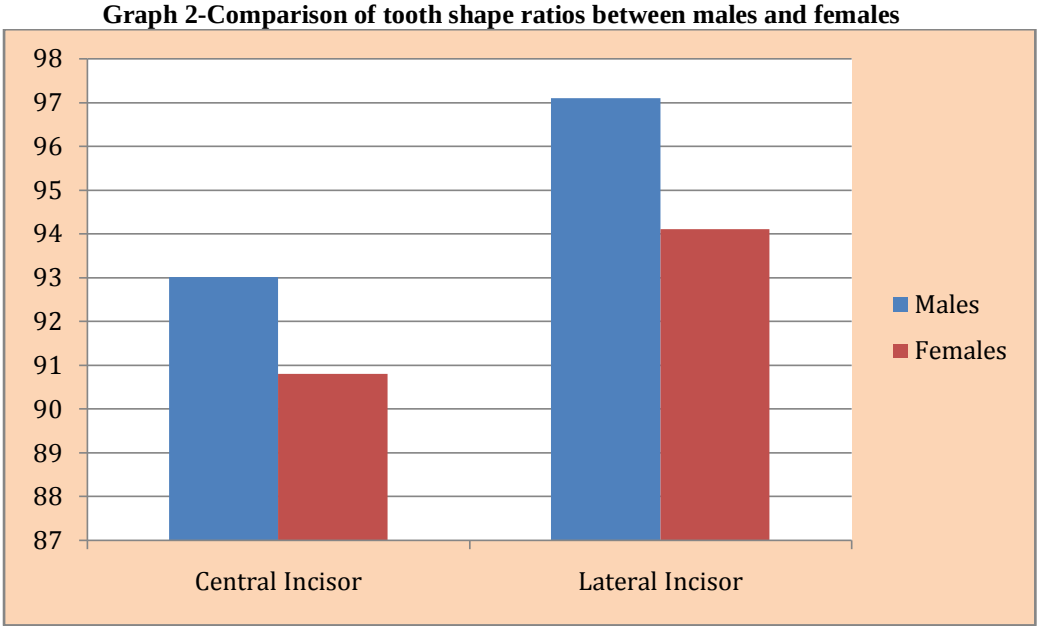
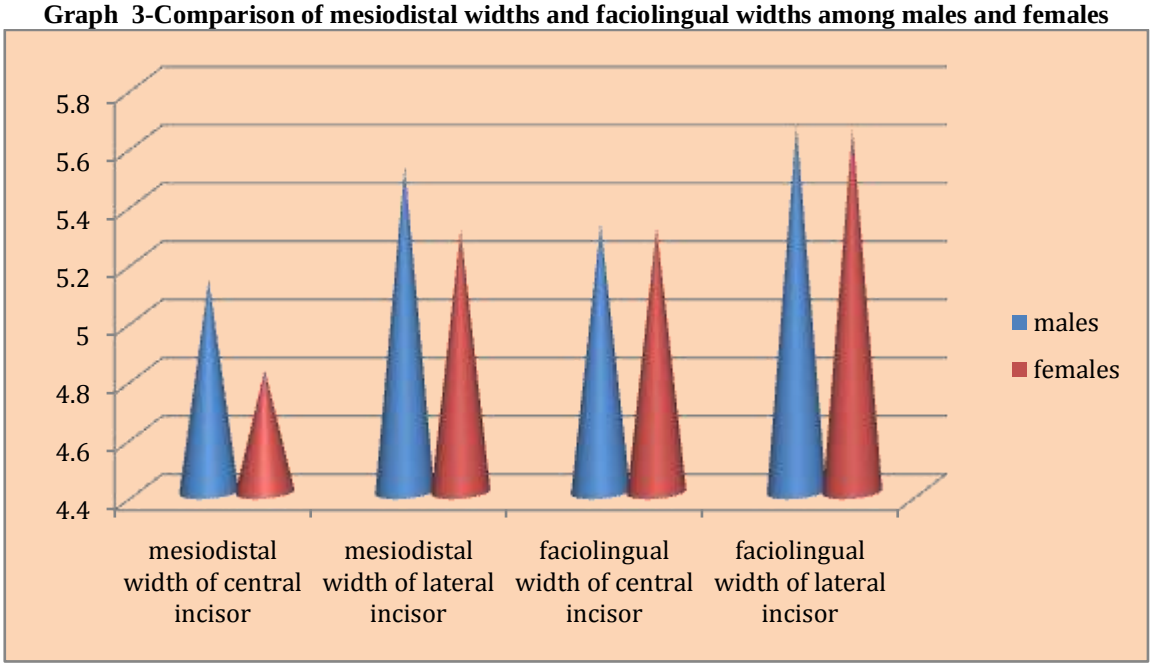


Table 3-Comparison of mesiodistal widths and faciolingual widths among males and females

Variables	Sex	Mean	SD	Zvalue
Mesiodistal width of central incisor	males	5.13	0.36	1.9670*
	females	4.82	0.33	
faciolingual width of central incisor	males	5.32	0.37	0.1039NS
	females	5.31	0.40	
Mesiodistal width of lateral incisor	males	5.52	0.39	1.9885*
	females	5.3	0.35	
Faciolingual width of lateral incisor	males	5.66	0.41	0.0150 NS

Significant at $p < 0.05$; NS: Not significant

Graph 3-Comparison of mesiodistal widths and faciolingual widths among males and females



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IV. RESULTS

The study was conducted to check the validity of Peck and Peck ratio among Bhopal population.

This study involves 180 sets of pre-treatment study models of patients out of which 90 are males and 90 are females.Z Tests were performed among the variables.

Significant differences were found between Peck and Peck analysis values observed in present study with the Peck and Peck Index (Table1,Graph1).Ratio of central incisor for males was 93.01± 4.2 and for females was 90.8 ± 6.8. ratio of lateral incisor for males was 97.1± 5.7 and for females was 94.11± 6.1.

In the present study, significant differences were observed for the tooth shape ratios between the two sexes(Table 2,Graph 2). Ratio of central incisor for males was 93.01± 4.2 and for females was 90.8± 6.8. Ratio of lateral incisor for females was 97.1± 5.7 and for females was 94.11± 6.1.

Mesiodistal width of central incisor for males was 5.13± 0.36 and for females was 4.82± 0.33.mesiodistal width for lateral incisor for males was 5.52 ± 0.39 and for females was 5.3 ± 0.35.Faciolingual width of central incisor for males was 5.32 ± 0.37 and for females was 5.31 ± 0.40 .Faciolingual width of lateral incisor for males was 5.65 ± 0.40(Table 3,Graph 3). This study showed significant differences for mesiodistal widths between the two sexes but it is also observed that the mean faciolingual width did not show any significant difference.

V. DISCUSSION

Peck and Peck [1] observed relationship between mandibular incisor shape and the presence and absence of mandibular incisor crowding and came to the conclusion that it has significant clinical relevance. The mesiodistal/faciolingual index as previously described and utilized is a numerical expression of crown shape. As such, it provides an effective clinical method for diagnosing tooth shape deviations which influence and contribute to mandibular incisor crowding.

Therefore the following study was conducted in the Department of Orthodontics and Dentofacial Orthopedics, RKDF Dental College and Research Centre, Bhopal.

The study consisted of study models of 180 patients in the age range of 14 to 28 years. This age group was chosen because it was found to be the best sample for tooth size measurements as there are fewer chances of mutilation and attrition in early permanent dentition[13].

Significant differences observed for the shape ratios between the present study and the earlier Peck and Peck study. (Table1,Graph1).This indicated that differences existed in tooth sizes between the earlier study samples and the present study samples.

In the present study, significant differences were observed for the tooth shape ratios between the two sexes. (Table2,Graph2). It was observed that index values were high for males than females whereas earlier Peck and Peck study did not found any significant differences between tooth shape ratios for males and females.

Our study showed significant differences for mesiodistal widths between the two sexes but it is also observed that the mean faciolingual width did not show any significant difference(Table3,Graph3).. This proved that the main contributor for the change in shape ratios between the two sexes is the mesiodistal width.

The present study was in accordane with Smith RJ et al [14] who re-evaluated Peck and Peck ratio on a different population, different age group, ethinicity and occlusal status. In each population, incisor crowding is correlated with the tooth shape ratios, confirming the general observations of Peck and Peck[1]. In multiple regression equations to predict crowding in each population, incisor mesiodistal lengths are the most important variable, and neither the tooth shape ratios nor labiolingual widths significantly improve the equations.

The study was inconsistent with Puneky PJ et al [15] who determine the contribution of lower incisor tooth dimension to their alignment after many years of treatment. Tooth dimensions included the maximum mesiodistal (MD) and faciolingual (FL) dimensions and the shape ratio represented by MD/FL. The results showed the lack of association between lower incisor tooth dimensions and their alignment was found in a sample of eighty-six adults with untreated malocclusions.

The study was also inconsistent with Shah AA et al [4] investigated the correlations between the shape of mandibular incisor crowns and crowding. The lower incisors were sectioned and imaged at the contact point and midpoint levels, and the mesiodistal width was measured. Crowding was quantified by using both Little's irregularity index and anterior tooth size-arch length discrepancy. No predictors of lower incisor crowding could be established from mandibular incisor crown shape in this study.

VI. CONCLUSION

The study was carried out to check the validity of Peck and Peck analysis for Bhopal population.

- Significant differences observed for the tooth shape ratios between the present study and the earlier Peck and Peck study.
- In the present study, significant differences were observed for the tooth shape ratios between the two sexes. It was observed that index values were high for males than females whereas earlier Peck and Peck study did not found any significant differences between tooth shape ratios for males and females.
- The Present study showed significant differences for mesiodistal widths between the two sexes but it is also observed that the mean faciolingual width did not show any significant difference.

It was also observed that in our sample, though the tooth shape ratios were in the normal range of Peck and Peck, they had mild crowding (< 2MM).It is therefore concluded, that original Peck and Peck ratio cannot be used as an absolute guide for bhopal population. Comparison of these findings in cases with moderate to severe crowding will be required, to conclusively prove the validity of Peck and Peck index among Bhopal population.

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